



ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 • (217) 782-3397

BRUCE RAUNER, GOVERNOR

LISA BONNETT, DIRECTOR

Project Summary for a
Construction Permit Application from
Midwest Generation for a
Natural Gas Conversion Project for the
Joliet Electric Generating Station
Joliet, Illinois

Site Identification No.: 197809AAO
Application No.: 15030051

Schedule:

Date Application Received: March 31, 2015
Public Comment Period Begins: August 10, 2015
Public Hearing: September 24, 2015
Public Comment Period Closes: October 9, 2015

Illinois EPA Contacts:

Permit Analyst: Robert Smet
Community Relations Coordinator: Brad Frost

4302 N. Main St., Rockford, IL 61103 (815) 987-7760
595 S. State, Elgin, IL 60123 (847) 608-3131
2125 S. First St., Champaign, IL 61820 (217) 278-5800
2009 Mall St., Collinsville, IL 62234 (618) 346-5120

9511 Harrison St., Des Plaines, IL 60016 (847) 294-4000
412 SW Washington St., Suite D, Peoria, IL 61602 (309) 671-3022
2309 W. Main St., Suite 116, Marion, IL 62959 (618) 993-7200
100 W. Randolph, Suite 10-300, Chicago, IL 60601

I. INTRODUCTION

Midwest Generation has applied for an air pollution control construction permit for a natural gas conversion project for its existing Joliet Generating Station (Joliet Station). The boilers at this station currently burn low-sulfur western coal. The proposed project would convert the boilers from burning coal to burning natural gas. As part of this project, Midwest Generation would also construct a natural gas-fired auxiliary boiler and natural gas-fired fuel heaters. This project will greatly reduce the emissions of most pollutants from the station, including emissions of sulfur dioxide (SO₂), nitrogen oxides (NO_x) and particulate matter (PM).

The Illinois Environmental Protection Agency (Illinois EPA) has reviewed the application and made a preliminary determination that the application for the proposed project meets applicable requirements. Accordingly, the Illinois EPA has prepared a draft of the construction permit that it would propose to issue for the project. Before issuing a permit, the Illinois EPA is holding a public comment period and a public hearing to receive comments on the proposed issuance of the permit and on the proposed terms and conditions of the draft permit.

II. PROJECT DESCRIPTION

Midwest Generation is planning to convert its existing Joliet Station from coal to natural gas. This station currently has five large coal-fired boilers that produce steam that is used to generate electricity. These boilers will be converted to burn natural gas. Coal handling operations at the station will also be permanently retired. Following this project, these boilers will continue to produce steam that will be sent to the existing steam turbine generators at the station to make electricity.¹

Because these boilers will no longer burn coal, certain emission standards that currently apply to these boilers will no longer be applicable. Certain existing emission control equipment that is currently required because these boilers burn coal will no longer be required. The electrostatic precipitators will not be needed for control of particulate emissions because natural gas is a gaseous fuel that does not contain ash. Likewise, the sorbent injection systems for the control of mercury emissions will no longer be required. The emissions monitoring that is required on the boilers for pollutants other than nitrogen oxides (NO_x) will also change.

As part of this conversion project, Midwest Generation will construct an auxiliary boiler and several fuel heaters, all fired on natural gas. The

¹ While the Joliet Station has five boilers, it only has three steam turbine generators. The combinations of these steam turbine generators and the boiler or boilers that supply them with steam are referred to as "electric generating units" (EGUs). EGU 6 at the Joliet Station has a single boiler, Boiler 5. The other EGUs each have two boilers. EGU 7 includes Boilers 71 and 72. EGU 8 includes Boilers 81 and 82.

These five boilers also only have three stacks. Boiler 5 has its own stack. Boilers 71 and 72 share a common stack. Boilers 81 and 82 also share a common stack.

auxiliary boiler would be much smaller than the existing boilers.² It is needed because the Joliet Station will no longer be a base load power plant and there will be times when none of the existing "main" boilers are in service. At such times, the auxiliary boiler would be available to provide steam if needed for heating at the station. This boiler will also provide steam to support the startup of the main boilers. The fuel heaters, also known as "pipeline heaters," will indirectly heat the natural gas supply for the main boilers. These heaters will be much smaller than the existing boilers.³ These fuel heaters are needed to counteract the cooling of the natural gas that will occur when its pressure is reduced from the level in the pipelines supplying the Joliet Station to the lower operating pressure of the piping at the station.

III. PROJECT EMISSIONS

This project will be accompanied by large reductions in annual emissions of regulated pollutants other than volatile organic material (VOM) from the Joliet Station, as summarized in Table 1 of this project summary. The project is expected to reduce the station's annual emissions by over 17,000 tons of SO₂, 2,000 tons of NO_x and 700 tons of particulate matter₁₀ (PM₁₀). The Joliet Station will continue to be a non-major source for VOM emissions, with annual emissions of no more than 97 tons/year. The reductions in emissions will occur because natural gas does not contain sulfur and ash like coal. It can also be more readily burned in boilers than coal. The Joliet Station will also cease to handle coal for the boilers. Finally, the Joliet Station will now operate as an intermediate load or seasonal power plant.

The changes in emissions from this project were determined from the difference between the current or baseline annual emissions of the station before this project and the future annual emissions of the station following this project. The future annual emissions of the station were based on the proposed levels of permitted annual operation of the main boilers on natural gas and the proposed levels of permitted operation of the new natural gas-fired units. In practice, the actual reductions in annual emissions with this conversion project will be more than projected. This is because the units will normally operate in the future at less than their permitted levels of annual operation. The actual reductions in emissions will also be larger as units operate with reasonable margins of compliance from the projected or permitted emission rates. Similarly, in practice, the actual annual VOM emissions of the Joliet Station will be less than permitted.

The proposed project would not be a major modification for purposes of New Source Review, i.e., Illinois' rules for Major Stationary Sources

² The nominal rated heat capacity of the auxiliary boiler would be no more than 286 million Btu per hour (mmBtu/hour). This is less than a tenth the capacity of the smallest existing boiler at the Joliet Station.

³ The current design for this project includes six fuel heaters, three larger heaters with a capacity of 11 mmBtu/hour each and three smaller heaters with a capacity of 3 mmBtu/hour each.

Construction and Modification (MSSCAM), 35, IAC Part 203, and the USEPA's rules for Prevention of Significant Deterioration of Air Quality (PSD), 40 CFR 52.21. The Greater Chicago Area, including Joliet, is a non-attainment area for ozone air quality so applicability of MSSCAM had to be considered for emissions of NOx and VOM, which are precursors to the formation of ozone in the atmosphere. As the Greater Chicago Area is attainment or unclassified for air quality for all criteria pollutants other than ozone, applicability of PSD had to be addressed for emissions of regulated NSR pollutants other than VOM.⁴ Because the Joliet Station is a major source under PSD, the proposed project would be a major modification or major project for a regulated PSD pollutant if it would result in a significant increase of a regulated PSD pollutant. As discussed, for pollutants other than VOM, this project will reduce annual emissions. The proposed project would not result in significant increases in emissions of any regulated PSD pollutants. For applicability of MSSCAM for NOx, the circumstances are similar since the Joliet Station is a major source for NOx. This project will reduce annual NOx emissions so it is not a major project for NOx for purposes of MSSCAM. For applicability of MSSCAM for VOM, the circumstances are different because the Joliet Station is not a major source for VOM.⁵ This project will not result in the Joliet Station becoming a major source for VOM emissions. Accordingly, this project is also not a major project for VOM.

IV. APPLICABLE EMISSION STANDARDS

Introduction

All emission units in Illinois must comply with state emission standards adopted by the Illinois Pollution Control Board. The state's emission standards represent the basic requirements for sources in Illinois. For many emission units, federal emission standards are also applicable. New emission units may be subject to New Source Performance Standards (NSPS), 40 CFR Part 60, adopted by USEPA for various categories of new emission units. Both new and existing emission units may be subject to National Emission Standards for Hazardous Air Pollutants (NESHAP), 40 CFR Parts 61 and 63 adopted by USEPA to address emissions of hazardous air pollutants (HAPs) from various categories of emission units. In addition, coal-fired utility units, like the main boilers at the Joliet Station, are subject to standards for NOx emissions at 40 CFR Part 76 adopted by USEPA as part of the federal Acid Rain Program. Following conversion to natural gas, the main boilers at the Joliet Station, as natural gas-fired boilers, should readily comply with applicable emission standards. Likewise, the new emission units, which will also burn natural gas, should also readily comply with applicable emission standards.

⁴ Emissions of NOx must be addressed for applicability of PSD, as well as applicability of MSSCAM. NOx is also a precursor to nitrogen dioxide, another criteria air pollutant, for which USEPA has adopted National Ambient Air Quality Standards. Emissions of VOM are only regulated under New Source Review as a precursor to ozone.

⁵ In 2014, the annual VOM emissions of the Joliet Station, as reported by Midwest Generation in its Annual Emission Report, were only 20.98 tons/year.

Main Boilers

For the main boilers, conversion to natural gas will result in certain emission standards that currently apply to these boilers no longer being applicable. The main boilers will no longer be subject to the state emission standards that currently apply to PM and SO₂ emissions, i.e., 35 IAC 212.201 and 212.203 and 35 IAC 214 Subpart E, respectively). The PM and SO₂ emission rates of boilers burning natural gas are minimal. Illinois has not adopted standards for either PM or SO₂ emissions from boilers that burn natural gas. The future PM and SO₂ emission rates of the main boilers on natural gas will be a fraction of those when burning coal. As such, the electrostatic precipitators that are currently used on the main boilers to comply with the applicable state standards for PM emissions will no longer need to be operated.

For Boiler 5, 35 IAC 214.141 will become applicable for NO_x emissions as a consequence of conversion to natural gas. Boiler 5 is currently exempt from this rule as a cyclone-fired boiler burning solid fuel. This rule limits NO_x emissions of existing large boilers in the Chicago major metropolitan area burning gaseous fossil fuel to 0.3 pounds per million Btu (lbs/mmBtu).⁶ This rule effectively became obsolete when 35 IAC 225.295(a) was adopted and Midwest Generation elected to comply with it. 35 IAC 225.295(a), which is now applicable to and will continue to address NO_x emissions of Boiler 5, in practice requires significantly lower rates of NO_x emissions from Boiler 5.⁷

Conversion of the main boilers to natural gas will not affect applicability of other state emission standards. These boilers will continue to be subject to the state standard for opacity at 35 IAC 212.123. Emissions of carbon monoxide (CO) will continue to be subject to 35 IAC 216.121. The applicability of emission standards for emissions of mercury, SO₂ and NO_x under 35 IAC Part 225 will also not be changed.⁸ However, because coal would no longer be burned, use of the sorbent injection systems on the boilers will no longer be needed to meet the standard for mercury.

Conversion of the main boilers to natural gas will affect the applicability of NESHAP standards if other events do not occur that result in these boilers not being covered by or subject to NESHAP standards. The main boilers will no longer be subject to the NESHAP for Coal and Oil-Fired Electric Utility Steam Generating Units, 40 CFR 63

⁶ For Boilers 71 and 72 and Boilers 81 and 82, conversion to natural gas will also change the applicable limit for NO_x emissions pursuant to 35 IAC 217.141. The limit will also become 0.3 lbs/mmBtu of actual heat input, rather than 0.9 lbs/mmBtu as applicable for burning coal.

⁷ When Midwest Generation elected to comply with 35 IAC 225.295(a), it became subject to a "system-wide" annual NO_x emission limit of 0.11 lbs/mmBtu for the combination of electric generating units (EGUs) at its Joliet, Powerton, Will County and Waukegan Generating Stations.

⁸ A rulemaking is currently pending before the Pollution Control Board that among other matters, if adopted as proposed by the Illinois EPA, would exclude utility boilers that are permanently converted to natural gas from the standards of 35 IAC Part 225 for emissions of mercury and SO₂ (R2015-022).

Subpart UUUUU (commonly referred to as the Mercury and Air Toxics Standards or the MATS rules).⁹ This is because these boilers would no longer be coal-fired boilers, or oil-fired boilers, as those terms are defined by the MATS rules. This change would not occur immediately. As provided by 40 CFR 63.10000(f), the earliest this would occur would be six months after each boiler ceased to fire coal. However, before this occurs a federal court could find that the MATS rules are invalid so are not applicable for the current operation of the main boilers.¹⁰

When the main boilers are converted to natural gas, they may also become subject to the NESHAP for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters, 40 CFR 63 Subpart DDDDD. As the main boilers would burn natural gas, 40 CFR 63 Subpart DDDDD would require periodic combustion tuning to address emissions of organic HAPs. 40 CFR 63 Subpart DDDDD would become applicable if or when these boilers are no longer subject to the MATS rules. 40 CFR 63 Subpart DDDDD would also only become applicable if the USEPA has not made other changes to 40 CFR Part 63 that exclude gas-fired utility boilers from 40 CFR 63 Subpart DDDDD.¹¹

Conversion of the main boilers to natural gas will not affect applicability of the federal emission standards that currently apply to these boilers for NOx. These boilers will continue to be subject to the NOx emission standards that currently apply under the federal Acid Rain Program.^{12, 13}

⁹ For coal-fired utility boilers, the MATS rules set standards to address emissions of mercury, non-mercury metals and acid gases. The MATS rules also require periodic combustion tuning to address emissions of organic HAPs.

The main boilers at the Joliet Station generally became subject to the requirements of the MATS rules on April 16, 2015. These boilers have been issued a compliance date extension until April 16, 2016 for the standards that address emissions of non-mercury metals. This extension is based on conversion of these boilers to natural gas.

¹⁰ On June 29, 2015, the U.S. Supreme Court determined that the USEPA did not appropriately consider costs when adopting the MATS rules (*Michigan et al. v. Environmental Protection Agency et al*, U.S. Supreme Court, No. 14-46, June 29, 2015). The U.S. Court of Appeals for the District of Columbia must now decide whether these rules are invalid, i.e., the USEPA must completely redo this rulemaking, or whether the USEPA can supplement the rulemaking for MATS to appropriately consider costs, as directed by the U.S. Supreme Court. If the Court of Appeals finds that the current MATS rules are invalid, these rules would cease to be applicable to the main boilers at the Joliet Station as a result of that finding even if these boilers were not converted to natural gas. Until the Court of Appeals makes its decision, the MATS rule remains in place and the main boilers at the Joliet Station are subject to the applicable requirements of these rules.

¹¹ Before adopting NESHAP standards for utility boilers, USEPA was required by Section 112(n)(1) of the Clean Air Act to perform a study of the hazards to public health from the emissions of HAPs from the electric utility steam generating units. Based on this study, USEPA then had to find that adoption of NESHAP standards was necessary and appropriate. It made such a finding for coal-fired and oil-fired utility units, as reflected by its adoption of the MATS rules. However, the fact that the MATS rules do not address natural gas-fired utility units strongly suggests that USEPA did not make the finding required by Section 112(n)(1) of the Clean Air Act for natural gas-fired utility units.

¹² The applicable standards for NOx under the Acid Rain Program for Boiler 5, Boilers 71/72 and Boilers 81/82 are, respectively, 0.86, 0.40 and 0.40 lbs/mmBtu, calendar year

Auxiliary Boiler

The auxiliary boiler will be subject to state standards for opacity and emissions of CO and NO_x, i.e., 35 IAC 212.122, 216.121 and 217.164.

This boiler will be subject to the NSPS for Industrial-Commercial-Institutional Steam Generating Units, 40 CFR Part 60 Subpart Db. This NSPS sets a standard for the NO_x emissions of this boiler. This boiler will also be subject to the NESHAP for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters, 40 CFR 63 Subpart DDDDD. As a boiler that fires natural gas, this NESHAP requires periodic combustion tuning to maintain efficient combustion.

Fuel Heaters

The fuel heaters will all be subject to a state standard for opacity i.e., 35 IAC 212.123. The larger fuel heaters, which have a heat input capacity greater than 10 mmBtu/hour, will also be subject to a state standard for emissions of CO.

The larger fuel heaters will be subject to the NSPS for Industrial-Commercial-Institutional Steam Generating Units, 40 CFR Part 60 Subpart Db. This NSPS sets a standard for the NO_x emissions of this boiler. The fuel heaters will all also be subject to the NESHAP for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters. As units that fire natural gas, this NESHAP requires periodic combustion tuning to maintain efficient combustion.¹⁴

V. DRAFT PERMIT

The Illinois EPA has prepared a draft of the construction permit that it would propose to issue for this project. For the main boilers, this permit addresses the changes in air pollution control requirements that will result from conversion to natural gas. In addition to changes to the applicability of emission standards, the permit addresses changes to the continuous monitoring that is required under applicable rules. When the main boilers are converted to natural gas, an alternative, simpler monitoring methodology will be used for SO₂ emissions. This methodology is based on the sulfur content of the natural gas burned in the

average. These standards also effectively became obsolete when Midwest Generation elected to comply with 35 IAC 225.295(a), which now requires Midwest Generation to achieve a system-wide annual NO_x emission rate of 0.11 lbs/mmBtu.

¹³ Conversion of the main boilers at the Joliet Station to natural gas also will not affect applicable requirements under the federal Acid Rain Program, 40 CFR Part 73, or the Cross State Air Pollution Rule, 40 CFR Part 97, related to SO₂ and NO_x allowances.

¹⁴ The larger fuel heaters will also be subject to the NSPS for Small Industrial-Commercial-Institutional Steam Generating Units, 40 CFR Part 60 Subpart Dc. Because the capacity of each of these units will be less than 30 mmBtu/hour and they burn natural gas, no emission standard under this NSPS will apply to these heaters.

boilers.¹⁵ If monitoring for mercury emissions continues to be required following conversion to natural gas, a simpler methodology may be used to quantify mercury emissions.¹⁶ This methodology, which is available for EGUs that qualify as low-emitting units for mercury emissions, is based on periodic measurements of mercury emissions rather than continuous monitoring. Continuous opacity monitoring will also be able to be discontinued.¹⁷ These changes reflect the recognition in the relevant rules that continuous emission monitoring is not warranted for emissions of SO₂ or mercury or for opacity from natural gas-fired utility boilers. The construction permit also identifies the existing air pollution control permits that address the operation of the main boiler on coal, providing that these permits will terminate when the main boilers are converted to natural gas.

For the new auxiliary boiler and fuel heaters that will be constructed be part of this project, the permit will address the air pollution control requirements that apply to these units. In addition to applicable emission standards, this includes applicable compliance procedures. For the auxiliary boiler, these procedures include continuous emissions monitoring for NO_x pursuant to the NSPS, 40 CFR 60 Subpart Db.

This permit will also include provisions to address the non-applicability of New Source Review for this project. For NO_x and VOM, it will establish enforceable limits on the future emissions of the main boilers and on the emissions of the new units to ensure that this project is not a major project subject to MSSCAM. In addition to limits on annual emissions of NO_x and VOM, the permit will include short-term limits on NO_x and VOM

¹⁵ "Optional SO₂ Emission Data Protocol for Gas-Fired and Oil-Fired Units," Appendix D to 40 CFR Part 75, as addressed by 40 CFR 75.11(d)(2).

¹⁶ When the main boilers are no longer subject to the MATS Rule following conversion to natural gas, monitoring of mercury emissions will no longer be required pursuant to these federal rules. With respect to state rules, Pollution Control Board Proceeding R2015-022, the rulemaking that is currently pending before the Board that would, among other matters, exclude EGUs that are permanently converted to natural gas from the standards of 35 IAC Part 225 for emissions of mercury, would also no longer require monitoring for mercury emissions for such EGUs. If 35 IAC Part 225 is not revised as proposed, monitoring for mercury would need to continue. However, such monitoring could be conducted using the low mass emissions excepted monitoring methodology, as provided for by 35 IAC 22.240(a)(4).

¹⁷ Pursuant to the Acid Rain Program, before discontinuing continuous opacity monitoring pursuant to 40 CFR 75.14(c), Midwest Generation must demonstrate that the main boilers or EGUs qualify as "gas-fired units" as defined by 40 CFR 72.2. To accomplish this, Midwest Generation must submit to USEPA a minimum of 720 hours of unit operating data following the change in the boiler(s)' fuel usage, showing that no less than 90.0 percent of its heat input is from the combustion of gaseous fuels and the remaining heat input is from the combustion of fuel oil, and a statement that this changed pattern of fuel usage is considered permanent and is projected to continue for the foreseeable future. Alternatively, Midwest Generation could submit three calendar years of data following the change in the boiler(s)' fuel usage, showing that no less than 90.0 percent of its average annual heat input during the previous three calendar years, and no less than 85.0 percent of its annual heat input during any one of the previous three calendar years, is from the combustion of gaseous fuels and the remaining heat input is from the combustion of fuel oil.

emissions and operational limits for fuel usage, as needed to provide practical enforceability of the annual emission limits for NOx and VOM emissions.¹⁸ For the new units, the permit will also include limits of emissions of pollutants other than NOx and VOM as appropriate to assure that the emissions of the new units are not significant. These limits will be accompanied by procedures to assure compliance, including requirements for emission testing, required work practices, operational monitoring, recordkeeping, and reporting. These measures are imposed to assure that the operation and emissions of the subject units are appropriately tracked to confirm compliance with the various limits that would be established by the permit.

VI. REQUEST FOR COMMENTS

It is the Illinois EPA's preliminary determination that the application for an air pollution control construction permit for the proposed project meets all applicable state and federal air pollution control requirements, subject to the conditions in the draft permit. The Illinois EPA is therefore proposing to issue a construction permit for this project. Comments are requested on this proposed action by the Illinois EPA and the conditions of the draft permit.

¹⁸ For VOM emissions, these supporting limits for the annual emissions of the main boilers would be "phased." The permitted annual VOM emissions in both phases would be identical. However, in the initial phase, there would be more restrictive limit for the fuel usage of the boilers and a higher limit for the short-term VOM emission rate. In the second phase, after emission testing has been completed showing that the main boilers meet a lower short-term VOM emission rate, the limit for the fuel usage of the boilers would be higher and the boilers would be subject to the lower short-term VOM emission rate.

ATTACHMENT 1:

Summary of Project Emissions^a (Tons/Year)

Emission Unit(s)	NOx	CO	SO ₂	PM	PM ₁₀ ^b	PM _{2.5} ^b
Existing Units (Main Boilers)						
Baseline Actual Emissions	6160	5355	17060	2440	2023	1049
Future Emissions	4040	3611	21	66	266	266
Change	-2120	-1744	-17039	-2374	-1757	-783
New Units						
Auxiliary Boilers	24.8	25.2	0.41	1.3	5.24	5.24
Fuel Heaters	9.3	4.4	0.7	0.7	0.7	0.7
Subtotal	34.1	29.6	1.1	2.01	5.94	5.94
Total	-2086	-1714	-17038	-2372	-1751	-777
Total w/o decreases	34.1	29.6	1.1	2.01	5.94	5.94
Significant Emission Rate	40	100	40	25	15	10
Greater Than Significant?	No	No	No	No	No	No

Notes:

- a. This summary does not address VOM emissions. For VOM, the source will be limited to annual emissions of 98 tons so that it is not a major source for VOM.
- b. PM₁₀ and PM_{2.5} emissions include condensable particulate, as well as filterable particulate.